

What is claimed is:

1. A device for sorting particles in parallel, comprising:
an input reservoir configured to hold a mixture of first particles and one or more second particles;

5 a transport mechanism configured to move portions of the mixture in parallel from the input reservoir; and

a plurality of sorter units in fluid communication with the input reservoir and configured to receive the portions of the mixture, each sorter unit being configured to selectively move at least one second particle, if received in one of
10 the portions, from a path followed by first particles received in the one portion so that the at least second particle follows a different path.

2. The device of claim 1, further comprising a manifold configured to place the input reservoir in fluid communication with the sorter units.

15 3. The device of claim 2, wherein the manifold defines a conduit network that branches as it extends from the input reservoir to the sorter units.

4. The device of claim 1, wherein the transport mechanism is
20 configured to provide continuous transport of the portions of the mixture, and wherein each sorter unit includes a pulse-activated transport mechanism configured to selectively move the at least one second particle.

5. The device of claim 1, wherein the mixture is disposed in a fluid,
25 and wherein the transport mechanism is configured to apply at least one of a positive and a negative pressure to the fluid.

6. The device of claim 5, wherein the transport mechanism is
30 configured to apply a negative pressure to the fluid downstream of the plurality of sorter units.

7. The device of claim 1, further comprising one or more receiver structures in fluid communication with the plurality of sorter units and downstream thereof.

5 8. The device of claim 7, wherein the one or more receiver structures include a single receiver configured to receive first particles from each of the sorter units.

9. The device of claim 7, wherein the transport mechanism is
10 configured to apply a positive pressure to the fluid in the input reservoir.

10. The device of claim 7, wherein the one or receiver structures include a single receiver configured to receive the at least one second particle from at least two of the plurality of sorter units.

15 11. The device of claim 7, wherein each sorter unit is in fluid communication with a different receiver structure so that the at least one second particle moved by different sorter units are placed in different receiver structures.

20 12. The device of claim 11, wherein the different receiver structures are wells of a microplate.

13. The device of claim 1, wherein the mixture of first particles and one or more second particles is a mixture of different types of cells.

25 14. The device of claim 1, wherein the transport mechanism is configured to operate by dielectrophoresis.

15. A device for sorting particles, comprising:

an input reservoir configured to hold a mixture of first and second particles;

a fluid supply reservoir configured to hold a fluid; and

a plurality of sorter units in parallel fluid communication with each of the
5 input and fluid supply reservoirs, each sorter unit including a pair of adjacent first
and second channels in fluid communication, the first channel being configured to
receive a portion of the mixture from the input reservoir, the second channel
being configured to receive a portion of the fluid from the fluid supply reservoir,
the sorter unit being configured to selectively move at least one of the second
10 particles, if received in the portion from the input reservoir, to the second channel
from the first channel.

16. The device of claim 15, further comprising a conduit network
configured to place the input reservoir in fluid communication with the plurality of
15 sorter units, the conduit network branching as it extends from the input reservoir
to the sorter units.

17. The device of claim 15, wherein the first channel follows a path, and
wherein each sorter unit includes a transport mechanism configured to selectively
20 apply a transient pressure pulse to a segment of fluid disposed in the first
channel, the transient pressure pulse being directed transversely of the path.

18. The device of claim 15, which further comprises a continuous
transport mechanism configured to operate substantially continuously to move
25 the portion of the mixture to each of the sorter units.

19. The device of claim 18, wherein the fluid of the fluid supply reservoir
is a first fluid, the mixture of particles being disposed in a second fluid, and
wherein the continuous transport mechanism is configured to apply a pressure to
30 each of the first and second fluids.

20. The device of claim 15, wherein the first and second particles are different types of cells.

21. The device of claim 15, which further comprises a transport
5 mechanism configured to move the mixture by dielectrophoresis.

22. A device for sorting particles, comprising:
a substrate having a surface;
a fluid barrier connected to the substrate so that a plurality of branched
10 channels are formed, each branched channel defining a first path and a second path;
an input reservoir configured to hold a mixture of first particles and one or more second particles and also configured to release portions of the mixture so that the portions travel substantially along the first path of the branched channels;
15 and
thin-film electrical devices formed adjacent the surface of the substrate and selectively operable to move at least one of the second particles from the first path to the second path of the branched channels.

20 23. The device of claim 22, wherein the substrate is formed substantially of one of a semiconductor and glass.

24. The device of claim 22, wherein each branched channel includes an adjacent channel in fluid communication with the branched channel, and wherein
25 the adjacent channel and the branched channel have different inlet and outlets.

25. The device of claim 22, wherein the thin-film electrical devices include thin-film heaters.

26. The device of claim 22, wherein the thin-film electrical devices include light sensors configured to sense optical properties of the first and second particles of the mixture.

5 27. A method of sorting particles, comprising:
 creating a plurality of particle streams from a mixture of first particles and
 one or more second particles; and
 selectively displacing a second particle from at least one of the plurality of
 streams.

10 28. The method of claim 27, which further comprises sensing particles
 disposed in each of the plurality of streams.

15 29. The method of claim 27, wherein selectively displacing a second
 particle includes selectively displacing at least one second particle from two or
 more of the streams.

20 30. The method of claim 29, which further comprises combining the at
 least one second particle selectively displaced from the two or more streams.

25 31. The method of claim 29, which further comprises separately
 processing the at least one second particle from each of the two or more streams
 after selectively displacing.

30 32. The method of claim 31, wherein the at least one second particle is
 at least one cell having a plurality of constituents, and wherein separately
 processing includes at least one of culturing the at least cell, lysing the at least
 one cells, and sensing one or more of the plurality of constituents.

33. The method of claim 27, wherein creating includes passing portions of the mixture through a manifold.

34. The method of claim 27, wherein the first particles and the one or
5 more second particles are disposed in a fluid, and wherein creating includes applying a pressure to the fluid to move portions of the mixture into different channels.

35. The method of claim 27, wherein selectively displacing transfers a
10 fraction of the at least one stream from a first channel to a second channel.

36. The method of claim 27, which further comprises combining remaining portions of the streams after selectively displacing.

37. The method of claim 27, wherein selectively displacing includes
15 actuating one of a heating element and a piezoelectric element.

38. The method of claim 27, wherein the at least one stream is disposed in a fluid and moves in a direction, and wherein selectively displacing
20 includes applying a force to the fluid transverse to the direction.

39. A device for sorting particles, comprising:

means for creating a plurality of particle streams from a mixture of first particles and one or more second particles; and

25 means for selectively displacing a second particle from at least one of the plurality of streams.

40. A program storage device readable by a processor, tangibly embodying a program of instructions executable by the processor to perform methods steps for sorting particles in parallel, the method steps comprising:

- creating a plurality of particle streams from a mixture of first particles and
- 5 one or more second particles; and
- selectively displacing a second particle from at least one of the plurality of streams.